

**Annexure-IV**  
**Syllabi to be Modified for B Tech Program**

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3HS03	Environmental Science	2	0	0	2

**UNIT I Environmental Communication and Public Awareness**

Multidisciplinary nature of environmental studies: Scope and Significance of environmental education; Concept of sustainability and sustainable development – Principles, imperatives and threats; three E's to optimize sustainable development, Sustainable Agriculture and Organic Farming.

An Introduction to Environmental laws in India: Environmental Impact Assessment and Environmental Auditing. Policies for Disaster preparedness programs, Rehabilitation measures and long term reconstruction, Psychosocial care provision during the different phases of disaster

**UNIT II Domestic and Global Environmental Concerns**

Domestic environmental concerns: Disaster management – Introduction, types, disaster management cycle; Case studies of terrorist incidence, Bomb threat; Solid Waste management: Introduction, types of solid waste, methods to manage; Deforestation; Urbanization and Energy requirements

Global environmental concerns: Global Challenges - climate change and global warming, Kyoto Protocol, Greenhouse Gases, Ways to reduce Greenhouse gases emissions, Carbon Footprint, ways to reduce carbon footprint, Carbon Trading; Ozone layer depletion, Acid rain and impacts on human communities and agriculture.

**UNIT III Natural resources and Environmental Pollution**

Natural Resources: Land resources and land use change; Land degradation, soil erosion, salinization and desertification. Water: Use and over exploitation of surface and ground water;; Forest Resources; Food resources. Case studies on natural disaster: Earthquake, floods, cyclone, volcanoes; Energy resources: Renewable and nonrenewable energy sources, use of alternate energy sources.

Environmental pollution: types, causes, effects and control of; Air, water, soil and noise pollution;.

**UNIT IV Ecosystem and Biodiversity**

Ecosystem: Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.

Biological diversity: types of biodiversity; its significance, threats and conservation.

**UNIT V Sustainable habitat and Green Technology**

Sustainable Habitat: Concept of Green Building and its rating systems, Volatile Organic Compounds (VOC), Heating Ventilation and Air Conditioning (HVAC) systems.

Green Technology: Hybrid Vehicle Technology, Industrial ecology, Green Technology, Green Business, Green Computing, Green Chemistry.

### Text Books

1. Environmental Science by Dr. Surinder Deswal, Dhanpat Rai & Co. publication
2. Environmental Studies by R. Rajgopalan, Oxford IBH Publication 2011

### Reference Books

1. Environmental Science (8 th Edition) (2010): Daniel D. Chiras, Jones & Bartlett Ltd
2. Introduction to Environmental Science and Engineering (2nd Ed.) (2004): G. M. Masters, Pearson Education Pvt. Ltd.
3. Environmental Chemistry: A. K. De, New Age International, 1996
4. G.J. Rau and C.D. Wee ten, "Environmental Impact Analysis" Hand book, McGraw Hill, 1980.
5. Petts Judith, 1999, Handbook of environmental impact assessment. Vol. 1, Blackwell Science
6. Govt. of India, 2009, National Disaster Management

### Web Source

1. <http://www.circularecology.com/sustainability-and-sustainable-development.html#.WwOcRkiFPIU>
2. <http://markdiesendorf.com/wp-content/uploads/2015/09/CorpSust2000.pdf>
3. <http://www.fao.org/docrep/005/v9933e/v9933e02.htm>
4. <http://www.yourarticlelibrary.com/essay/disaster-management-in-india-classification-policies-and-other-details/25006>
5. <https://ndma.gov.in/en/>
6. <https://www.conserve-energy-future.com/sources-effects-methods-of-solid-waste-management.php>
7. <https://beeindia.gov.in/sites/default/files/1Ch9.pdf>
8. <https://www.ugc.ac.in/oldpdf/modelcurriculum/Chapter2.pdf>
9. <http://download.nos.org/333courseF/10.pdf>
10. <http://download.nos.org/333courseF/5.pdf>
11. [http://www.unesco.pl/fileadmin/user\\_upload/pdf/BIODIVERSITY\\_FACTSHEET.pdf](http://www.unesco.pl/fileadmin/user_upload/pdf/BIODIVERSITY_FACTSHEET.pdf)
12. <http://www.nistads.res.in/images/ISTIP/report/green%20technology.pdf>

### Open Learning Source

1. <https://swayam.gov.in/courses/public>
2. <http://nptel.ac.in/course.php>

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## Syllabus

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
EN3BS01	Engineering Mathematics-I	3	1	0	4	4

### Course Objectives.

- 1 To impart analytical ability of using concepts of matrices in various fields of engineering
- 2 To equip the students with the knowledge of Differential Calculus.
- 3 To equip the students with the knowledge of Integral Calculus.
- 4 To impart analytical ability in solving Ordinary Differential Equations of first and Higher order.
- 5 To impart analytical ability in solving Second Order Differential Equations and to understand the concept of series solution about an ordinary point.

**Pre-requisites: Basic knowledge of Differentiation, Integration and Matrices.**

**Co-requisites : Basic Mathematical Skills**

### Curriculum:

#### Unit I Matrices and Linear Systems

Rank and Nullity of a Matrix by reducing it into Echelon & Normal Forms, Solution of Simultaneous equations by elementary transformation methods, Consistency and Inconsistency of Equations, Eigen Values and Eigen Vectors, Cayley- Hamilton Theorem, Applications in Translation and Rotation.

#### Unit II Differential Calculus

Geometrical interpretation of first order derivative, Rolle's theorem, Meanvalue theorem, Leibnitz theorem, Taylors and Maclaurin's series expansions. Functions of Several variables, Partial differentiation, Geometrical interpretation of partial derivatives, Total Derivative, Differentiation of Composite and Implicit functions, Euler's Theorem, Maxima and Minima of function of two variables.

### **Unit III Integral Calculus**

Definite Integrals as a limit of a sum, its application in summation of series, Beta and Gamma functions (Definitions, Relation between Beta and Gamma functions, Duplication formula, Applications of Beta and Gamma Functions). Curve tracing (curves in Cartesian and polar form with standard curve). Multiple Integral (Double and Triple Integrals), Change the Order of Integration, Applications of Multiple Integral in Area, Volume, Surfaces and Volume of Solid of Revolution about X-Axis and Y-Axis.

### **Unit IV Ordinary Differential Equations**

First order differential equations (Separable, Exact, Homogeneous, Linear), Linear differential Equations of second and higher order with constant coefficients, Homogeneous linear differential equations, Simultaneous linear differential equations.

### **Unit V Second-Order Linear Differential Equations with Variable Coefficients**

Solution by method of undetermined coefficients, by known integral, Removal of the first derivative, Change of independent variable and Variation of parameters. Series Solution about ordinary point.

#### **Case Studies:**

Not Applicable.

#### **List of Practical's:**

Not Applicable.

#### **Project:**

Optional.

#### **Course Outcomes:**

- A. The students will be able to apply the tools of matrices in solving the system of simultaneous equations and apply the knowledge in translation and rotation of matrices.
- B. The students will be able to apply the tools of differential calculus to relevant fields of engineering and understand the concept of several variables
- C. The students will be able to apply the tools of integral calculus to relevant fields of engineering and understand the concept of multiple integrals in finding area of regions and volume of solids
- D. The students will be able to solve Ordinary Differential Equations using different methods.

- E. The students will be able to solve Second order differential equations using different methods and will be able to find series solution about an ordinary point.

**Text Books:**

- 1 B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, New Delhi.
- 2 H.K. Dass, *Higher Engineering Mathematics*, S. Chand & Company Pvt LTD., New Delhi

**Reference Books:**

1. B.V. Ramana, *Higher Engineering Mathematics*, Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. .Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons .
3. .R.K. Jain and S.K. Iyengar, *Advanced Engineering Mathematics*, Narosa Publishing House, New- Delhi.

**Web Source:**

1. <http://nptel.ac.in/courses/111108066/>
2. <http://nptel.ac.in/courses/111104085/>

**Open Learning Source:**

1. <https://swayam.gov.in/courses/public>
2. <http://nptel.ac.in/course.php>



Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3BS04	Engineering Chemistry	3	0	2	4

#### UNIT I

**Water and its Industrial Applications:** Sources, Impurities, Hardness & its units, Industrial water characteristics, softening of water by various methods (External & Internal treatment), Boiler trouble causes, effect & remedies, Characteristics of municipal water & its treatment, Numerical problems based on softening methods.

**Water Analysis Techniques:** Alkalinity, hardness (Complexometric), Chloride, Free chlorine, DO, BOD and COD, Numerical problems based on above techniques.

#### UNIT II

**Fuels & Combustion:** Definition, Classification - Calorific Value (HCV and LCV) and Numerical Problems on Calorific Value -Combustion of Fuels, Numerical Problems on Combustion - Solid Fuels: Coal and Coke - Liquid Fuels: Petroleum and its Distillation, Cracking, Octane and Cetane Values of Liquid Fuels, Synthetic Petrol, Power Alcohol - Bio-Gas

#### UNIT III

**Lubricants:** Introduction, Mechanism of lubrication, Classification of lubricants, Properties and Testing of lubricating oils, Numerical problems based on testing methods.

**Polymer:** Introduction, Natural & Synthetic Rubber; Vulcanization of Rubber, Preparation, Properties & uses of the following- Polythene, PVC, Teflon, Nylon 6:6, Silicone Resin, Biopolymers, Biodegradable polymers.

#### UNIT IV

**Cement & Refractories:** Manufacture, IS-code, Setting and hardening of cement. Refractory: Introduction, classification and properties of refractories.

**New Engineering Materials:** (Brief Idea of Following): Superconductors and its applications, Fullerenes, Optical Fiber, Nanomaterials-Carbon nanotubes, Nanowires and their applications

#### UNIT V

**Instrumental Techniques in Chemical Analysis:** Introduction, Principle, Electromagnetic spectrum,

Instrumentation and applications of IR, UV, Visible, Gas Chromatography, Lambert's and Beer's Law and its limitations.

**Electrochemical Systems:** Electrochemical cells and EMF, Applications of EMF measurements.

#### Text Books

1. P C Jain, Monk Jain, Engineering Chemistry, Dhanat Rai Publications.
2. S. S. Dara, A Text Book of Engineering Chemistry, S. Chand & Company.

### Reference Books

1. Joseph, Environmental Studies, Tata McGraw Hill.
2. A.K. De, Environmental Chemistry, New Age International.
3. Shashi Chawla, Engineering Chemistry, Dhanpat Rai Publications.

### List of Practicals

#### Volumetric Analysis

1. To determine Hardness of given water sample by Complexometric titration.
2. To determine total and mixed Alkalinity of given water sample using phenolphthalein and methyl orange as indicator.
3. To determine strength of unknown FAS solution by redox titration using N-Phenyl anthranilic acid as internal indicator.
4. To determine strength of unknown  $\text{CuSO}_4$  solution by iodometric titration using Starch as internal indicator.
5. To determine Chloride content of water sample by Mohr's method (Argentometric titration).

#### Fuel Testing

1. To determine moisture content in given sample of coal by proximate analysis.
2. To determine volatile content in given sample of coal by proximate analysis.
3. To determine ash content in given sample of coal by proximate analysis.
4. To determine percentage carbon content of coal by proximate analysis.
5. To determine penetration number of grease by Cone Penetrometer apparatus.
6. To determine flash and fire point of given oil sample by Cleveland's open cup apparatus.
7. To determine flash point of given oil sample by Penskey Marten's close cup apparatus.
8. To determine flash point of given oil sample by Abel's Close cup apparatus.
9. To determine Steam emulsification number of given lubricant.
10. To determine Aniline point of given oil sample.
11. To determine Cloud and Pour point of given lubricating sample.
12. To study rate of change of viscosity with temperature of the given lubricating oil by means of Redwood Viscometer no.1
13. To study rate of change of viscosity with temperature of the given lubricating oil by means of Redwood Viscometer no.2.

#### Kinetics

Effect of concentration and temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid.

#### Electrochemistry

Variation of cell potential in  $\text{Zn}/\text{Zn}^{2+} // \text{Cu}^{2+}/\text{Cu}$  with change in concentration of electrolytes ( $\text{CuSO}_4$  or  $\text{ZnSO}_4$ ) at room temperature.

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## Syllabus

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		L	T	P	Credits
EN3BS05	Engineering Physics	3	1	2	5

### Unit-I Laser and Fibre Optics:

Spontaneous and Stimulated emission of radiation, Population inversion, Einstein's A & B co-efficient, Optical resonator and Condition necessary for active Laser action, Ruby Laser, He-Ne Laser, Properties and applications of lasers.

Optical Fibre - Core and cladding, total internal reflection, Classification of fibre, Calculation of numerical aperture and acceptance angle, losses in the fibre, applications, V-number.

### Unit-II Optics:

Interference: Conditions for sustained interference, double slit as an example. Spatial and Temporal Coherence, Fresnel's biprism, Newton's ring experiment and applications.

Diffraction of light: Fresnel and Fraunhofer class, Fraunhofer diffraction for single slit, Intensity distribution, N-slits and plane transmission grating. Missing orders and Rayleigh criterion of Resolution.

General concept of Polarization, Plane of vibration and plane of polarization, Malus's law, Brewster's law, Double refraction (birefringence) - Ordinary and Extra-ordinary rays, Polaroid, Nicol prism.

### Unit-III Quantum Mechanics and Crystal Physics:

**Quantum mechanics:** Inadequacies of Classical Mechanics, Duality nature of electromagnetic radiation, De Broglie hypothesis for matter waves, Phase and group velocity. Heisenberg's uncertainty principle with its elementary proof, Compton scattering, wave function, Schrodinger's wave equation, Particle confinement in 1D box (Infinite Square well potential).

**Crystal Physics:** Crystal directions, Planes and Miller indices, Symmetry elements, packing factor.

### Unit-IV

**Mechanics:** Newton's laws of motion and its explanation, pseudo forces (e.g. Centrifugal force), Coriolis force and its applications, Motion under a central force, Gravitational law and field, Potential due to a spherical shell, System of particles, centre of mass and reduced mass, Conservation of linear and angular momentum, elastic and inelastic collisions.



## **Unit-V Acoustics and Superconductivity:**

**Acoustics:** Reverberation time, absorption coefficient, Sabine's and Eyring's formulae, Applications - Designing of hall for speech, concert, and opera;

**Superconductivity:** Superconductivity, Zero resistance, persistent currents, superconducting transition temperature ( $T_c$ ), Type-I and Type-II superconductors, Meissner effect

### **Text Books**

1. Textbook of Optics: S. Chand Publications.
2. Gaur and Gupta, Engineering Physics, Dhanpat Rai Publications.
3. Beiser Concepts of Modern Physics, TMH.

### **Reference Books**

1. Dr. M N Avadhanulu , Dr. R. S. Hemne, An Introduction to Lasers- Theory and Applications. Chand Publications.
2. K. Thyagarajan, Ajoy Ghatak, Lasers: Fundamentals and Applications, Springer Science and Business Media.
3. Ghatak and Thyagrajan, An Introduction to Fiber Optics, Cambridge University Press.

### **Web Resources:**

1. <https://phet.colorado.edu/en/simulations>.
2. <http://nptel.ac.in/courses/122103011/39>.

### **Suggested List of Practicals**

1. To determine the thickness of wire using diode laser.
2. To determine the radius of curvature of Plano convex lens using Newton's ring experiment.
3. To determine the wavelength of given sodium vapour lamp using Fresnel's Bi prism.
4. To find the wavelength of spectral lines of mercury vapor lamp using help of transmission grating
5. To measure the numerical aperture of an optical fiber by scanning method.
6. Determination of Planck's constant ( $h$ ) using light emitting diode (LED) of various colors.
7. To find the frequency of AC mains using Melde's method in Longitudinal / Transverse arrangement.
8. To determine the specific optical rotation of sugar solution by biquartz polarimeter.
9. To determine the value of acceleration due to gravity ( $g$ ) using compound pendulum.
10. To determine the Standard deviation of any one of the following, by algebraic formula
  - a) Thickness of the given scale by Vernier calipers
  - b) Diameter of the wire by Screw gauge
11. Mini Project

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3ES01	Basic Civil Engineering	3	0	2	5	4

### Unit-I Introduction To Civil engineering

Role of Civil Engineer in the construction of buildings, dams, expressways and infrastructure projects for 21st century. Importance of an inter- disciplinary approach in engineering.

Building Materials: Bricks composition, classifications, properties and uses. Stone classification of rocks, quarrying, and Dressing properties uses. Timber properties uses ply wood.

Cement : grades ,types, properties, uses.

Steel: types, mild steel, medium steel, hard steel, properties, uses, market forms.

Concrete: grade designation, properties, uses.

### Unit-II Material Properties

Forces and its components , Resolution and summation of forces , center of gravity, Stress, strain types, Hook's law, three moduli of elasticity, poissons ratio, relationship, factor of safety

### Unit-III Building Components

Building selection of site, classification components. Soils: types of soils, bearing capacity of soils, Foundations functions, classifications. Flooring requirements, selection types, cement concrete marble, terrazzo floorings. Roof - types and requirements.

### Unit-IV Basic Infrastructure

Surveying-classification, general principles of surveying – Basic terms and definitions of chain, compass and leveling surveying , uses of surveying , contours, their characteristics and uses.

### Unit-V Water Supply and Sewage Disposal

Dams purpose, selection of site, types of dams and components. Water supply, objective, quantity of water, sources, standards of drinking water, distribution system. Sewage classification technical terms septic tank components and functions.

### Text Books

1. K.V.B. Raju and P.T. Ravichandran, Basics of Civil Engineering, Ayyappa Publications, Chennai, 2012.
2. S. Gopi, Basic Civil Engineering, Pearson Publishers, 2009.
3. S.C. Rangwala, Building materials, Charotar Publishing House, Pvt. Limited.
4. M.S. Palanichamy, Basic Civil Engineering, Tata Mc Graw Hill.
5. S.Ramamurtham , BAsicCivil Engineering and Engineering Mechanics , Dhanpat Rai.

### List of Practicals

1. To determine particle size distribution & fineness modulus of coarse and fine aggregates.
2. To determine (a) normal consistency (b) Initial and final setting time of cement sample by Vicat's apparatus.
3. To determine the workability of fresh concrete of given proportion by slump cone test.
4. To determine the area of land by chain surveying.
5. To perform traverse surveying with prismatic compass check for local attraction and determine corrected bearing and to balance the traversing by Bowditch's rule.
6. To perform levelling practices by (A) height of Instrument and (B) Rise and Fall methods.
7. To perform Plane Table Surveying work by (A) Radiation method and (B) Intersection methods.
8. To measure horizontal and vertical angles in the field by using Theodolite.
9. To find young's modulus of elasticity
10. To find C.G. of a plane area

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3ES02	Engineering Graphics	3	0	2	5	4

### Unit -I

Drawing scales: Engineering scale, graphical scale, plain scale, diagonal scale, comparative scale, scale of chord.

Geometric Constructions and Engineering Curves: Division of lines, curves, angles and other simple construction elements. Conic sections parabola, ellipse and hyperbola. Spiral, involute and helix. Cycloidal curves.

### Unit-II

Projections of points : Including points in all four quadrants

Projections of lines: Line parallel to reference plane, perpendicular to reference plane, inclined to one reference plane, inclined to both reference planes, traces of line.

Orthographic Projections: Reference planes, types of orthographic projections—First angle projections, Third angle projections.

### Unit-III

Auxiliary Projections: Auxiliary planes, Auxiliary Vertical Plane (AVP), Auxiliary Inclined Plane (AIP), symmetrical auxiliary view, unilateral auxiliary view, bilateral auxiliary view.

Projection of Solids: Classification of solid. Projections in simple and complex positions of the axis of the solid. Combination of solids.

Sections of Solids: Sectional views and true shape of the section.

Development of Surfaces: Methods of developments, development of various solids, transition pieces, spheres.

### Unit-IV

Isometric Projections: Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, construction of isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, Sphere.

Free hand sketching: Prerequisites for freehand sketching, sketching of regular and irregular figures

### UNIT V

Computer Aided Drawing (CAD): Points, Lines planes and Solids and their projections, intersections Sectional views, Developments.

#### Text Books:

1. N.D. Bhatt, Elementary Engineering Drawing, Chartor Publishing House.
2. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd.
3. P.S. Gill, Engineering Graphics, S.K. Kataria and Sons.
4. Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi.
5. F. E. Giesecke, A. Mitchell & others, Principles of Engineering Graphics, Maxwell McMillan Publishing.
6. K.C. John, Engineering Graphics for Degree, PHI Learning Pvt. Ltd.

**Laboratory:** Preparation of drawing sheets containing the drawings for topics covered in theory.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3ES03	Basic Mechanical Engineering	3	1	2	6	5

### Unit-I Materials & Mechanical Measurement

Classification of Engineering material, Composition of cast iron and carbon steels on iron-carbon diagram and their mechanical properties, Alloy steel and their applications, stress-strain diagram, Hooks law and modulus of elasticity. Tensile, shear, hardness and fatigue testing of materials. Temperature, pressure, velocity, flow, strain, force and torque measurement, concept of measurement error & uncertainly analysis, measurement by Vernier caliper, micrometer, dial gauges, slip gauges, sine-bar and combination set; introduction to lath, drilling, milling and shaping machines.

### Unit-II Thermodynamics

Thermodynamic properties and systems, First and second law of thermodynamics, steam properties, thermal processes at constant pressure, volume, enthalpy & entropy, Refrigeration, vapor absorption & compression cycles, COP, refrigerant properties & eco friendly refrigerants.

### Unit-III I.C. Engines

Description and working of four stroke petrol engines, two stroke petrol engines, four stroke diesel engines and two stroke diesel engines, relative merits and demerits.

Steam generators: Definition, Classification, general study of Cochran, Babcock Wilcox, Lancashire and Locomotive boilers, boilers mountings and accessories, Draught Classification, Calculation of Chimney height, boiler efficiency and numerical.

### Unit-IV Centroid & Moment of Inertia

Location of centroid and Moment of Inertia of plane areas, Perpendicular Axis and Parallel Axis theorems, Product of Inertia, Principal Axes and Principal Moment of solid bodies.

### Unit V Transmission of Power

Transmission of power through Belt, Rope and Gears, Ratio of tension on tight side and slack sides, Centrifugal tension. Gears: Helical, Spur, Bevel, Worm gearing, Rack and Pinion gear, Gear Trains, Simple and compound pulleys, Lifting machines.

### Text Books:

1. R. Yadav Thermodynamics, Central Publishing House
2. P.K. Nag, Engineering Thermodynamics, McGraw Hill.
3. T.S. Rajan, Basic Mechanical Engineering, Wiley Eastern Ltd.
4. S.B. Mathur, S. Domkundwar, Elements of Mechanical Engineering, Dhanpat Rai & Sons.
5. S.K. Hazra Chaudhry, Elements of Workshop Technology Vol. I, Asia Publishing Co. Ltd.
6. M.L. Mathur, F.S. Mehta and R.P. Tiwari, Elements of Mechanical Engineering, Jain Brothers, New Delhi.



## **List of Practicals**

1. Measurements using Vernier caliper, micrometer, dial gauges, slip gauges, sine-bar and combination set.
2. Preparation of micro specimen.
3. To study micro structural characteristics of gray cast iron white cast iron and malleable cast iron.
4. Tensile Testing of standard mild steel specimen
5. Investigate the first law and Second law of thermodynamic using heat Engine
6. Study of different type of boilers and mounting
7. Study of various IC engines
8. To find the centriod of different plane laminas and to calculate their moment of inertia about different axis.
9. To find moment of inertia of flywheel.
10. To find Mechanical advantage and efficiency of Screw Jack.
11. To study different types of gears and their nomenclature.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3ES04	Basic Electrical & Electronics Engineering	3	1	2	6	5

### Unit-I Fundamental of Circuit Theory:

Introduction to DC and AC circuits, Active and passive two terminal elements, Voltage-Current relations for resistor, inductor, capacitor, Kirchhoff's laws, Mesh analysis, Nodal analysis, Ideal and practical sources, equivalent resistor, current division, voltage division. Introduction to magnetic circuits- Simple magnetic circuits, Faraday's laws, induced emfs and inductances.

### Unit-II Circuit Analysis

Circuit Theorems: Superposition, Thevenin's, Norton's, Reciprocity, Maximum Power Transfer and Millman's Theorem. Star-Delta Transformation. RL, RC and RLC circuits (series and parallel), Phasor representation, Q-factor, Bandwidth.

### Unit-III Transformers and Rotating Machines

Ideal Transformer, Single Phase Transformers: Principle of Operation of a Single Phase Transformer, EMF equation, Phasor diagram, Equivalent Circuit, Determination of Equivalent Circuit Parameters, Regulation and Efficiency of a single phase transformer. Operating principle of autotransformer. Introduction to rotating machines e.g. Dc motor, Induction motor, synchronous machines and their characteristics (with derivation).

### Unit-IV Diodes and Transistors

Band theory of solids, qualitative discussion of Kronig-Penny Model, effective mass, Fermi-Dirac function, statistical distribution, Semiconductor Diode, Zener Diode, Rectifier Circuits, Wave Shaping Circuits, Bipolar Junction Transistors, JFET, MOSFET.

### Unit-V Digital System

Number Systems and Codes, Logic Gates, Boolean Theorems, De-Morgan's Theorems, NAND and NOR gate Latches, S-R Flip-Flop, J-K Flip-Flop, Binary Addition, 1's and 2's Complement System, Full Adder.

### Text Books

1. D.P. Kothari and I.J. Nagrath, Basic Electrical Engineering, Second edition, Tata McGraw - Hill.
2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, First edition, Pearson Education.
3. V.C. Deltoro, Electrical Engineering Fundamentals, Second Edition, PHI.
4. V.N. Mittal & Mittal, Basic Electrical Engineering, Tata McGraw - Hill
5. E. Fitzgerald, D.E. Hingumbotham and A. Grabel, Basic Electrical Engineering, McGraw-Hill.
6. J. Millman & C.C. Halkias, Integrated Electronics, Tata McGraw-Hill Education.
7. R. Boylestad, L. Nashelsky, Electronic Devices And Circuit Theory, Seventh Edition, PHI.

## **List of Practicals**

1. To verify KCL and KVL.
2. To verify Thevenin's theorem.
3. To verify Superposition theorem.
4. To verify Norton's theorem.
5. To perform short circuit test on a single phase transformer.
6. To perform open circuit test on a single phase transformer.
7. To verify V-I characteristic of Semiconductor diode.
8. To verify V-I characteristic of Zener diode.
9. To verify Input and Output waveform of Half wave Rectifier.
10. To verify Input and Output waveform of Bridge Rectifier.
11. To verify Input and Output characteristic of BJT in CB and CE configurations.
12. Implementation of basic logic gates using Universal gates (NAND, NOR).
13. Verify Truth Table of R-S and J-K Flip-flop using NAND gate.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3ES05	Basic Computer Engineering	3	0	0	3	3

### **Unit-I Introduction to Computers**

Basic Computer Operations, Classification of Computers, Components of Computer Hardware, Bus Architecture and Instruction Set, I/O devices, Software, Application of Computers, Number Systems, Primary Memory, Secondary Memory.

Basics of Data Structures: Introduction to data Structures, Defining an Array, Stack, Queue, Linked List as Data Structure.

### **Unit-II Database Management System**

Introductions to DBMS, File based approach and Database Approach, The Evolution of Data Models, Three level Architecture of DBMS, Data Independence, Data Dictionary, Database Administrator, Database Languages, Introduction to SQL.

### **Unit-III Introduction to Operating System**

Role of Operating System, Types of Operating Systems, Functions of Operating Systems, Process Management, File Management, Device Management, Security, Deadlocks, MS DOS, UNIX operating system, Linux Operating System, Windows Operating System.

### **Unit-IV Introduction to Computer Networks**

Definition and Purpose of Computer Network, Open System Interconnection, Types of Networks, Topologies in Network Design, Switching Techniques, TCP/IP Network Model, Basic Networking Devices, Introduction to Internet, Introduction to WWW and Network Security.

### **Unit-V Computer Languages and Software**

Introduction to Computer Languages, Evolution of Programming Languages, Classification and Generation of Programming Languages, Features of good Programming Language, Selection of Programming Language, Software Definition, Relationship between Software and Hardware, Software Categories, System Software Application Software.

### **Text Books:**

1. A.H.F. Silberschatz, Data Base System Concepts, McGraw -Hill.
2. A.S. Tanenbaum, Modern Operating Systems, Pearson Education.
3. A.S. Tanenbaum, Computer Networks, Pearson Education.
4. R. Mall, Fundamentals of Software Engineering , PHI



Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3ES06	Computer Programming	2	0	2	4	3

### Unit-I Problem Solving Methodology

Problem statement, Analysis, Design a solution, Implement/Coding the solution, Test the solution, Design tools (Algorithm, Flow-chart, Pseudo-code)- Develop algorithms for simple problems .

Programming Languages: Types and generation of programming languages- Compiler – Interpreter-Linker –Loader Execution of Program

### Unit II Basics of Language

Character set, Identifier, Keywords, Constants, Data Types, Variables and declaration, Operators and Expressions : Operator precedence and associativity, Expression Evaluation (Simple Examples) , Input and output functions , Simple computational problems involving the above constructs.

Control Statements: Selection, Conditional operator, Iteration (for, while, do-while), Branching (switch, break, continue, goto), Nesting of control statements- Problems using control statements.

### Unit-III Arrays and Strings

1D and 2D arrays, Searching (Linear and Binary), Sorting (Bubble, Selection), Matrix manipulation programs, Strings and basic operations on strings, Strings functions, Programs on string manipulation

Functions: Definition, Calling Declaration, Parameter Passing (by value and by reference), Recursion, Library functions, Programs based on functions

### Unit-IV User defined data types

Structure, Union, Enumerated data type, Programs involving structure and union.

Pointers: Declaration, Initialization, Pointers and arrays, Pointers and structures, Pointers and functions, Command line arguments, Dynamic memory allocation, Operations on pointers, Programs involving the above concepts

### Unit-V Files

File concept , File pointer, File handling operations (open, close, read, write etc) on sequential and random access files. Programs on file manipulations using fgetc(), fgets(), fseek.

#### Text Books:

1. Herbert Schildt, C: The complete Reference, Fourth Edition, Mc-Graw Hill.
2. R. Sethi, Programming Language Concepts and Constructs, Pearson Education
3. V. Rajaraman, Computer Programming in 'C' , PHI.
4. M. Sprankle, Programming and Problem Solving , Pearson Education
5. R.G. Dromey, How to solve it by Computer , Pearson Education.
6. E. Balguruswamy, Programming in ANSI C by, Tata Mc-Graw Hill

#### References Books

1. Kernighan and Ritchie , The 'C' programming language, PHI
2. Programming With C, Schaum Series.
3. A. N. Kamthane, Programming with ANSI and Turbo C, Pearson Education

## **List of Practicals**

1. Fibonacci series, Generation of Prime, Sum of Series
2. Matrix Addition, Subtraction and Multiplication
3. Sort by Name and Short by Number
4. Bitwise Operations
5. Case Conversion, Encoding and Decoding
6. String Operations
7. Array of Structures
8. Make Patterns
9. Implementation of Structures using Pointers
10. Pointers to Functions
11. Pointers to Pointers
12. Stack using Macros, header - size.h
13. Case Checking using Macros, Header - check.h
14. File Handling

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3ES07	Documentation and Presentation	0	0	2	2	1

**1. Introduction to Windows based documentation software**

- File handling in Windows environment.
- Analysis of applicability and suitability of tools like MS Word in document preparation.
- To study features like opening word, page layout, format options, document naming, setting for automatic save, spell and grammar check, tabulation, print preview, final save and print in MS word.
- Writing technical letters and reports.

**2. Introduction to Windows based database management software**

- Analysis of applicability and suitability of MS Excel in database management.
- Construction of worksheet and inserting data in MS Excel
- Use of mathematical formulas and functions in MS Excel.
- Presentation in the form of charts and graphs in MS Excel.

**3. Introduction to Windows based presentation software**

- Analysis of applicability and suitability of MS Power Point as presentation software.
- Creating, Opening and Saving Presentation in Power point.
- Study of different Views in power point.
- Working with Slides, Adding and Formatting Text, Making Notes, Pages and Handouts.
- Designing Slides show, Running and controlling presentation,
- Printing Presentations.
- Use of Multimedia in Presentation: Meaning, Graphics, Animation, Audio Images, Video Survey and Text.

**4. Introduction to documentation on Ubuntu**

- Introduction to Libre Office
- Text formatting using Libre Office (Writer).
- Spread sheets in Libre Office (Calc).
- Presentation in Libre Office (Impress).
- Comparison and compatibility with MS office

**Text Books:**

- G.B. Shelly, T.J. Cashman, M.E. Vermaat, Microsoft Office word 2007: Complete Concepts and Techniques, Cengage Learning Inc.
- C. Skintik ,Learning Microsoft Power point 2007, Pearson Education.
- LibreOffice 4.2 User Guide, Available at: <https://www.libreoffice.org/get-help/documentation/>

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3ES08	Engineering Workshop	0	0	2	2	1

### Unit-1 Carpentry Shop

Introduction to various carpentry tools and equipments like Cutting Tools-rip saw, tenon saw, firmer chisel, mortise chisel, iron jack plane, wooden jack plane, Tools-braces, drill bits, Striking Tools-hammers, mallet etc., Holding Tools-bench vice, G-cramp, Miscellaneous Tools- rasps, files, screw driver, pincer etc., Timber : Type, Qualities of timber disease, Timber grains, Structure of timber, Timber seasoning, Timber preservation. Wood Working tools: joints & joinery. Wood sizing exercise in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lap joint

### Unit –II Fitting Shop

Study and use of Measuring instruments, Engineer steel rule, Surface gauges caliper, Height gauges, feeler gauges, micro meter. Different types of files, File cuts, File grades, Use of surface plate, Surface gauges drilling tapping Fitting operations: Chipping filling, Drilling and tapping.

### Unit–III Foundry, Forging and Smithy

Pattern Making: Study of Pattern materials, pattern allowances and types of patterns. Core box and core print, Use and care of tools used for making wooden patterns.

Moulding: Properties of good mould & Core sand, Composition of Green, Dry and Loam sand.

Black Smithy Shop: Use of various smithy tools. Forging operations: Upsetting, Drawing down, Fullering, Swaging and Cutting down, Methods used to prepare simple green and bench and pit mould dry sand bench mould using single piece and split patterns.

### Unit– IV Welding

Study and use of tools used for Brazing, Soldering, Gas & Arc welding. Preparing Lap & Butt joints using gas and arc welding methods, Study of TIG & MIG welding processes. Safety precautions.

### Unit–V Machine Shop

Study of machine tools in particular Lathe machine (different parts, different operations, study of cutting tools). Demonstration of different operations on Lathe machine Practice of Facing, Plane Turning, step turning, taper turning, knurling and parting. Study of Quick return mechanism of Soks haper.

### Text Books

1. B.S. Raghuwanshi, Workshop Technology Vol. I & II, Dhanpath Rai & Sons.
2. K.C. John, Mechanical Workshop Practice. 2nd Edn. PHI.
3. Hajra Choudhury, Hajra Choudhary and Nirjhar Roy, Elements of Workshop Technology, vol. I Media promoters and Publishers Pvt. Ltd.
4. J.P. Kaushish., Manufacturing Processes, Prentice Hall India.

### References Books:



1. W. A.J. Chapman, Workshop Technology, 1998, Part -1, 1st South Asian Edition, Viva Book Pvt. Ltd.
2. P.N. Rao, 2009, Manufacturing Technology, Vol.1, 3rd Ed., Tata McGraw Hill Publishing Company.

### **List of Practicals**

1. **General:** Studies of mechanical tools, components and their applications:
  - i. Tools: Screw drivers, spanners, Allen keys, Cutting pliers etc. And accessories
  - ii. Components: Bearings, seals, O-rings, circlips, keys etc.
2. **Carpentry:** Any one model from the following:
  - i. T-Lap joint
  - ii. Cross lap joint
  - iii. Dovetail joint
  - iv. Mortise joint
3. **Smithy:**
  - i. Demonstrating the forgability of different materials (MS, Al, Alloy steel and Cast steel) in cold and hot states.
  - ii. Observing the qualitative differences in the hardness of these materials
  - iii. Determining the shape and dimensional variations of Al test specimen due to forging under different states by visual inspection and measurements
4. **Foundry:** Any one exercise from the following
  - i. Bench moulding
  - ii. Floor moulding
  - iii. Core making
5. **Sheet metal:** Any one exercise from the following Making
  - i. Cylindrical
  - ii. Conical
  - iii. Prismatic shaped jobs from sheet metal
6. **Welding:** Any one exercise from the following Making joints using Electric arc welding. Bead formation in horizontal, vertical and overhead positions
7. **Fitting and Assembly:** Filing exercise and any one of the following exercises Disassembling and reassembling of
  - i. cylinder piston assembly
  - ii. Tail stock assembly
  - iii. Time piece/clock
  - iv. Bicycle or any machine.
8. **Machines:** Demonstration and applications of Drilling machine, Grinding machine, Shaping machine, Milling machine and lathe.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3HS01	History of Science and Technology	2	0	0	2	2

### **Unit-I Historical Perspective**

Nature of science and technology, Roots of science and technology in India, Role of Science and Scientists in society, Science and Faith.

### **Unit-II Research and Development (R&D) in India**

Science and Technology Education, Research activities and promotion of technology development, Technology mission, Programs aimed at technological self reliance, activities of council of scientific and industrial research (CSIR).

### **Unit-III Policies and Plans after Independence**

Nehru's vision of science for independent India, Science and technological developments in the new era, science and technology developments during the Five Year Plan Periods and science and technology policy resolutions.

### **Unit-IV Science and Technological Developments in Major Areas**

Space – Objectives of space programs, Geostationary Satellite Services – INSAT system and INSAT services remote sensing applications, Launch Vehicle Technology. Ocean Development – Objectives of ocean development, marine research. Biotechnology - Applications of biotechnology in medicine, agriculture, food and fuel. Energy – Research and development in the field of nonconventional energy resources, India's nuclear energy program.

### **Unit-V Nexus between Technologies**

Transfer of Technology – Types, Methods, Mechanisms, Process, Channels and Techniques, Appropriate technology, Technology assessment, Technological forecasting, Technological innovations and barriers of technological change.

### **Text Books**

1. K. Rajaram, Science and Technology in India, Published and Distributed by Spectrum Books (P) Ltd., New Delhi.
2. M. Srinivasan, Management of Science and Technology (Problems & Prospects), East-West Press (P) Ltd., New Delhi.
3. G.R. Kohili, The Role and Impact of Science and Technology in the Development of India, Surjeet Publications.
4. Government of India, Five Year Plans, Planning Commission, New Delhi.
5. K.D. Sharma, and M.A. Qureshi, Science, Technology and Development, Sterling Publications (P) Ltd., New Delhi.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
EN3HS02	Communication Skill	2	0	2	4	3

### **Unit-I Grammar and Vocabulary Development**

Applied Grammar and usage, Parts of Speech, Articles, Tenses, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Clauses, modals, Reported Speech: Direct and Indirect, Sentence Structure, Punctuations. Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Basic Grammar & Vocabulary Practice, Synonyms, Antonyms, Analogies, Sentence Completion, Correctly Spelt Words, Idioms, Proverbs, Common Errors. Derivation from root words, Jargon, Scientific Jargon.

### **Unit-II Developing Reading Skills**

Reading Comprehension, Process, Active & Passive Reading, Reading Speed Strategies, Benefits of effective reading, note-making, note - taking, Reading comprehension of technical material and SQ3R reading technique

### **Unit-III Developing Writing Skills**

Planning, Drafting & Editing, Writing with style, right-words selection, writing effective sentences, developing logical paragraphs, art of condensation, précis, essay, technical definition and technical description

### **Unit-IV Listening Skills**

Meaning, process hearing and listening, types, barriers, importance.

### **Unit-V Speaking Skills Oral Presentation**

Preparation, Delivery using Audio – Visual Aids with stress on body language and voice modulations. (Topics to be selected by the Instructor.)  
Phonetic Symbols, Pronunciations

### **Text Books:**

1. P.C. Wren and Martin, High School English Grammar & Composition, , S Chand and Co Pvt Ltd.
2. P.C,Wren and N.D.V. Prasada Rao, High School English Grammar & Composition, S Chand and Co Pvt Ltd.
3. S. Kumar and P. Lata , English for Effective Communication, Oxford UP, New Delhi.
4. A.J. Thompson and A. V. Martinet, A Practical English Grammar, Oxford UP, New Delhi.
5. U. S. Rai and S.M, Rai, Effective Communication, Himalaya Publishing House.
6. J.S. Korlahalli and R. Pal, Essentials of Business Communication All Courses, Sultan Chand & Sons.

### **References Books**

1. A.C. Gimson, An introduction to the Pronunciation of English, ELBS.
2. S. Greenbaum, Thw Oxford English Grammer, Oxford University Press.
3. K.Mohan and M. Raman, Effective English Communication, Tata Mc-Graw Hill.

## **List of Practicals**

1. Exercises on Grammar.
2. Exercises based on reading and comprehension which also includes taking notes during presentation.
3. Writing technical description, paragraphs and editing.
4. Listening Comprehension
5. Presentations on various issues.
6. Delivering speeches and exercising voice modulation transcription.
7. Performing extempore, role plays, JAM.